VERNIER SOFTWARE

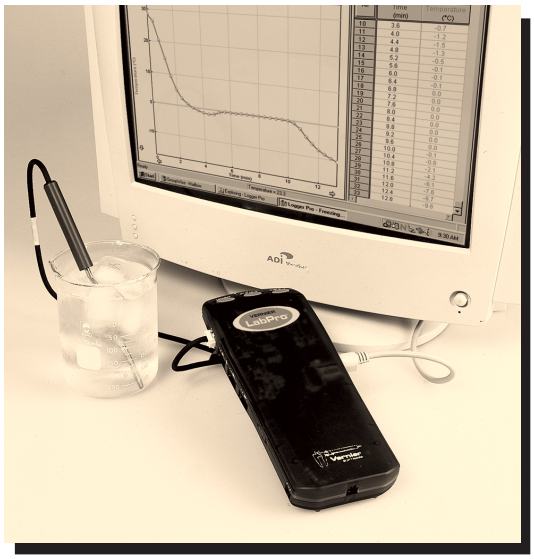
The Caliper

A Publication for Users of Vernier Software Products

Volume 16 Number 2 Fall 1999

NEW! Vernier LabPro™

Not just another pretty interface!



We have been working for over a year on the most exciting new product in the 19-year history of Vernier Software—LabPro. We have taken the best features of our earlier interfaces and combined them into one interface, while at the same time stressing ease of use. LabPro offers unparalleled flexibility, power, portability, and ease of use at an affordable price. You can use LabPro with a computer, with a TI graphing calculator, or as a stand-alone data logger. If you use it with a computer, you can choose to connect via the serial port or the USB port. It has four analog inputs, two digital inputs, and even analog and digital outputs. It has the speed you need to study sound, added memory for collecting thousands of data points, and flash memory for upgradability.

To make LabPro easier to use, we added many new features, the most important being automatic sensor recognition. When you plug in a new auto-ID probe, LabPro loads the calibration and other important information automatically so the sensor is ready to use. This works whether you are using LabPro with computers or calculators (or by itself). We have also added a new Quick Setup button for remote data collection, and new, simpler data logging methods. If you are using LabPro with a calculator, the programs you need are stored in the LabPro flash memory for easy transfer to the calculator.

LabPro has the same connectors as the CBL, so virtually all of your older Vernier sensors can be used. Some sensors will require adapters.

LabPro will be available in March, 2000. The 2-page insert in this newsletter will give you a good introduction to LabPro. Watch our web site for details on our new auto-ID sensors.

LabPro is a product of the alliance between Vernier Software and Texas Instruments. It has a companion product, CBL 2, which has the TI label. CBL 2 is a replacement for CBL and is described on page 2 of this newsletter.

IN THIS ISSUE

LABPRO

THE VERNIER ONLINE STORE

O_2 SENSOR

WATER QUALITY PACKAGES

DCU CONTEST

CBL 2

WORKSHOPS

New from Texas Instruments

CBL 2™

Our new LabPro interface and the TI CBL 2 were jointly developed by Vernier Software and Texas Instruments. As you would expect, there are similarities between LabPro and CBL 2, including the case, buttons, cradle, built-in user program for TI graphing calculators, Flash memory, and a calculator link cable. Of course there are differences, the biggest being that LabPro is designed for use with either computers or calculators, while CBL 2 is primarily a calculator interface. If you are a calculator user, you may still want to choose LabPro, since it has more ports, higher resolution, and offers more flexibility. In order to decide whether to go with LabPro or CBL 2, you should be aware of the similarities and differences. Here is a comparison:

	LabPro	CBL 2
Channels	4 analog and 2 digital	3 analog and 1 digital
Compatible Vernier analog sensors	All (for example, pH, Conductivity, Force, etc.)	All (for example, pH, Conductivity, Force, etc.)
Compatible Vernier digital sensors	Motion (2), photogate (2), radiation, rotary motion	Motion (1), photogate (1), radiation, rotary motion
Analog output	Yes	No
Maximum sample rate	50,000 samples/second	50,000 samples/second
Internal data storage	12,000 points	12,000 points
Resolution	12 bit	10 bit
Computer connections	Serial, USB, calculator link port	calculator link port
Compatible calculators	TI-82/83/83 Plus/86/89/92/92 Plus	TI-82/83/83 Plus/86/89/92/92 Plus
Built-in calculator program	Yes (DataMate)	Yes (DataMate)
Stand-alone use	Yes	Yes
Sensors included	Voltage	Temperature, light (qualitative), voltage
Additional included items	computer cables (both serial and USB), AC power supply, calculator link cable, calculator cradle, and user's manual	calculator link cable, calculator cradle, batteries, and user's manual
Availability	March, 2000	March, 2000
Cost	$220	$166

TI-Presenter™

Many teachers who use a CBL also use a TI ViewScreen™. A ViewScreen consists of a special graphing calculator that connects to a LCD panel. The panel fits on an overhead projector, which projects the calculator image. Now you have another option. The TI-Presenter allows the teacher to connect a ViewScreen calculator to a TV or audio-visual projection system. The TI-Presenter does not come with a ViewScreen calculator. Teachers can use ViewScreen calculators they already have or purchase one separately. Additional information about the Presenter can be found on the TI web site, www.ti.com/calc/presenter. (The Presenter will be available in December of 1999.) Order Code TI-PRE, $297.

TI-Graph Link for Windows

TI has developed an inexpensive Graph Link cable for Windows 95/98 and NT users. This cable is black and smaller than the gray Graph Link cable. (Please note that Windows 3.x and Macintosh users still need to use the gray TI-Graph Link cable.) We have a new version of our Graphical Analysis program that works with the new black TI-Graph Link cable. Please contact us if you need to update your version of Graphical Analysis for this cable. (Order Code GLC-WIN, $18)

The Caliper is published semiannually by Vernier Software.
It is distributed free of charge to Vernier Software customers.

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ImagiProbe is a registered trademarks of ImagiWorks, Inc.
Palm Computing is a trademark of Palm Computing, Inc., 3Com Corporation, or its subsidiaries.

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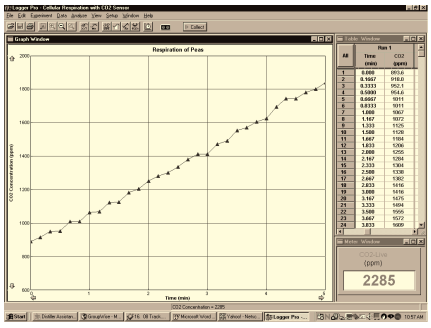
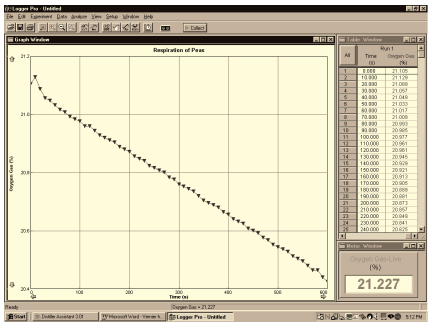
O_2 Gas Sensor

Ever since we began selling the CO_2 Gas Sensor, customers have been requesting a sensor that measures oxygen gas. The wait is over. We are proud to announce our new O_2 Gas Sensor (order code O2-DIN, $184). This new sensor is designed to measure oxygen concentration in air. Note that we have a different sensor, the Dissolved Oxygen Probe (order code DO-DIN), for measuring oxygen in water.

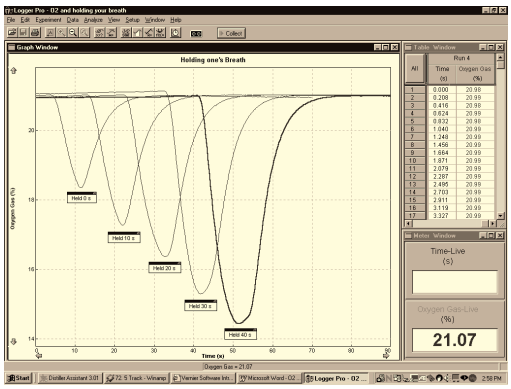
Included with the O_2 Sensor is a 250-mL Nalgene bottle to be used as a respiration chamber for studying plants and insects. The sensor's measurement range is 0% to 27% oxygen. For human respiration activities, the end of the sensor can connect to a 22-mm standard breathing tube.

Many of the experiments currently performed using the CO_2 Gas Sensor can be performed with or complemented by the O_2 Gas Sensor. When measuring CO_2 production during a respiration experiment, it might be very informative to measure oxygen consumption at the same time. The graph on the left (using the CO_2 Gas Sensor) illustrates increasing carbon dioxide levels as a sample of germinated peas respire. The graph on the right (using the O_2 Gas Sensor) was made with the same peas, and illustrates oxygen levels decreasing during respiration.





Due to its wide measurement range, the O_2 Gas Sensor performs remarkably well for monitoring oxygen concentration during human respiration. This graph illustrates the use of the sensor to monitor the concentration of oxygen gas expired over several trials by a single individual. In each trial, the subject held his breath for a different duration (0, 10, 20, 30, and 40 seconds) before expiring into the sensor. The O_2 Gas Sensor will be available in December, 1999.



Innovative Uses

Warren A. Turner and Glenn W. Ellis (Brunswick School, Greenwich, CT) describe a great mechanics experiment in the article "The Energetics of a Bouncing Ball" in the November, 1999 *The Physics Teacher*. They have the students take a complete look at the kinetic, potential, and total energy of a ball as it bounces. They used our ULI and Motion Detector.

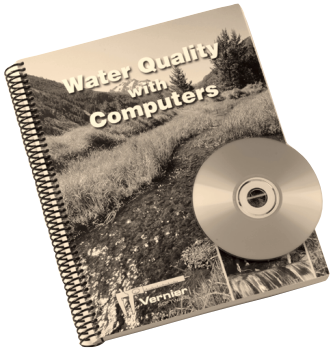
Vector Lab

The March, 1999 issue of *The Physics Teacher* includes an article entitled "Measuring Equilibrants with a Bracket-Mounted Force Sensor" by Robert Kingman and David Maddox (Andrews University, MI). The article shows how to use our Dual-Range Force Sensor and a force table for vector resolution labs and get great results. The Force Sensor is clamped on the force table using our Force Table Adapter (order code FTA-DFS, $25).

Stomp Rockets

Tom Bird (Austin Community College) uses our Biology Gas Pressure Sensor to study the launches of Stomp Rockets. This is a light-weight, inexpensive toy rocket, powered by air that is compressed by stomping on a plastic air chamber. He drilled and tapped a threaded hole and installed a pressure tap, which he connected to a Biology Gas Pressure Sensor. He then uses a CBL to capture the pressure data as the rocket is launched, graphing the pressure vs. time. He computes the impulse and a theoretical launch velocity. In addition, he uses a photogate to get the actual launch velocity, and manually times the round trip back to earth to confirm the launch velocity. He says that most of the time the velocities match to within 10%.

Water Quality with Computers



Our newest book, *Water Quality with Computers*, is now available. This 250-page manual (and accompanying CD) is a complete solution for determining water quality using Vernier sensors, interfaces, and Logger *Pro* software. *Water Quality with Computers* provides students and teachers with easy-to-follow directions for sixteen of the most common water quality tests. A comprehensive student introduction is included with each test, so students know why they are making a measurement, and what kind of results to expect. You can download three sample tests from this new book by following the link to "Sample Labs" on our web site. *Water Quality with Computers* is $35 (order code WQC-LP).

Water Quality Packages

Also new this fall are Computer and CBL Water Quality Packages designed to help make your purchasing decisions easier. As always, any item in a package may be purchased separately. Visit our web site, or contact us by e-mail or phone, if you have any questions.

Interface and Sensors	Computer Starter	Computer Deluxe	CBL Starter	CBL Deluxe
	WQ-IBM-STR WQ-MAC-STR	WQ-IBM-DX WQ-MAC-DX	WQ-CBL-STR	WQ-CBL-DX
Serial Box Interface (with a Rechargeable Battery Pack)	$158	$158	N/A	N/A
CBL System (includes temperature, light, & voltage probes)	N/A	N/A	$179	$179
Direct-Connect Temperature Probe	$28	$28		
Dissolved Oxygen Probe	$189	$189	$189	$189
pH Sensor	$72	$72	$72	$72
Conductivity Probe	$79	$79	$79	$79
Colorimeter	$99	$99	$99	$99
Flow Rate Sensor		$128		$129
Ammonium Ion-Selective Electrode		$149		$149
Calcium Ion-Selective Electrode		$149		$149
Chloride Ion-Selective Electrode		$149		$149
Nitrate Ion-Selective Electrode		$149		$149
ISE Amplifier		$39		$39
CBL-DIN adapters (2 @ $5 each)	N/A	N/A	$10	$10
TOTAL	**$625**	**$1388**	**$628**	**$1392**

For computers, purchase *one* of each	Order Code	Price	For CBL, purchase *one* of each	Order Code	Price
Water Quality with Computers lab manual	WQC-LP	$35	*Water Quality with CBL*™ lab manual	WQCBL	$35
Logger *Pro*™ software	LP-WIN/LP-MAC	$59	TI-Graph Link™	TI-GL	$55

Turbidity Sensor

The Vernier Turbidity Sensor will be available in January, 2000. This sensor measures the lack of clarity in water and will be a great addition to any water quality study. It is especially useful when the stream or lake being studied is so shallow that the more traditional Secchi Disk is not an option. Watch our web site for announcements concerning pricing and availability.

Science Humor

A lonely frog telephoned the Psychic Hotline and asked what his future held. His Psychic Advisor told him, "You are going to meet a beautiful young girl who will want to know everything about you." The frog was thrilled. "This is great! Will I meet her at a party, or on the river bank?" he croaked. "Neither," said the psychic. "In a biology class."

Questions and Answers About LabPro

Q: *What are the differences between LabPro and the Universal Lab Interface?*

A: LabPro has all the features of our Universal Lab Interface (ULI) and many more. It features automatic sensor recognition with six independent channels—four analog and two digital. LabPro can be used with a computer, with a TI graphing calculator, or as a stand-alone data logger. When used with a computer, it can be connected to a serial or USB port. It collects data faster than our ULI and supports analog output. LabPro is also less expensive than the ULI!

Q: *How does LabPro compare to the Serial Box Interface?*

A: LabPro supports more data collection channels than the Serial Box—four analog channels instead of two. Not only can LabPro be used with a computer, but it is completely portable as well. It can be used in the field with a TI graphing calculator or as a stand-alone device. Unlike the Serial Box Interface, LabPro can collect radiation, motion detector, photogate, and sound data.

Q: *Can I use LabPro with a new Macintosh® computer, which does not have a modem port?*

A: Yes, you can connect LabPro directly to the USB port on your iMac™, iBook™, G3, or G4 Macintosh computer—you do not need a USB-to-serial adapter. If you are using a Windows® 98 computer, you can use the USB port on your PC-compatible computer.

Q: *What computer software do I use with LabPro?*

A: Our award winning Logger *Pro* software supports the use of all our sensors with LabPro.

Q: *How is LabPro different from the new CBL 2?*

A: LabPro and CBL 2 are the result of a collaborative effort between Vernier Software and Texas Instruments. The interfaces share the same shape, cradle and overall look, but LabPro has more analog and digital ports. LabPro uses a 12-bit A/D converter, which means it has higher resolution than CBL 2. It also supports analog output. CBL and CBL 2 are primarily designed for use with TI graphing calculators. LabPro connects directly to either calculators or computers. (TI plans to support the use of CBL and CBL 2 with their TI Interactive! computer software and the TI-Graph Link cable.)

Q: *How is LabPro different from the original CBL?*

A: LabPro connects directly to calculators or computers. It has the calculator program stored in Flash memory. With a single button press, the program is loaded into the graphing calculator. LabPro has more memory and it collects data faster. It has more analog and digital ports. It supports a wider range of sensors, including two Motion Detectors at the same time. LabPro also supports our new auto-ID sensors.

Q: *How do I take data remotely using LabPro?*

A: There are two ways to take data remotely—one method uses a calculator and the other does not. To take data with LabPro by itself, you simply attach your auto-id sensors and press the Quick Setup button. This prepares the unit to collect data. Then press the Start/Stop button to begin collecting data. Press the Start/Stop button to stop data collection. The second option is to connect LabPro to a TI graphing calculator and run the DataMate program. The LabPro System even includes a cradle that holds the calculator and LabPro together.

Q: *Can I use my old sensors with LabPro?*

A: Yes, LabPro uses the same connectors as the original CBL. Since almost all Vernier sensors have been compatible with CBL for years, this will not be a problem. If you have Vernier computer sensors with order codes that end in "-DIN" or "-DG", you will need adapters ($5.00 each).

Q: *What about curricular materials?*

A: We will have a complete series of new lab manuals for LabPro for chemistry, biology, physics, physical science, middle school science, and water quality.

Q: *What is included with the LabPro System?*

A: You will get everything you need to connect LabPro to a computer and a graphing calculator. This includes the LabPro interface, computer cables (both Windows and Macintosh, serial and USB), AC power supply, calculator link cable, DataMate calculator program, calculator cradle, user's manual, and voltage sensor. (Logger *Pro* computer software is sold separately. As always, our software comes with a site license.)

Q: *How much does it cost and when can I get a LabPro?*

A: LabPro is $220. It will be shipping in March, 2000.

DCU Contest

We are announcing a contest for student projects using our new Digital Control Unit for CBL. The contest rules are simple.

- The goal is to create a device controlled by the Vernier Digital Control Unit (DCU), a CBL, and a TI graphing calculator.
- The winning entry will be selected for creativity, ingenuity, and functionality.
- Submit a video tape (VHS format) of your entry in action and a one-page summary of how your device works. The video entry should not be longer than 10 minutes. The videotape will not be returned.
- Absolutely nothing dangerous is allowed.
- A panel of Vernier Software employees will vote on the winning entry after viewing all the videotapes and studying the summaries.
- First prize is $200 and second prize is $100. If you win, you must ship the working version of the project (not the calculator, CBL, or DCU), complete with any programs, to Vernier Software in Portland, Oregon. (Keep this in mind when deciding on the size of your project.)
- The deadline for entries is March 15, 2000.

To summarize: We are looking for some interesting, entertaining projects that demonstrate exciting things students can do with the Digital Control Unit for CBL (order code DCU-CBL, $59). We plan to use the winning projects in our booth at science teacher conventions. We hope your students will enjoy the challenge, and that we end up with some great demonstration projects. Your students should be encouraged not to spend much money on this project.

If you have any questions, contact Dave Vernier, dvernier@vernier.com. We look forward to finding out about your projects.

10 Years Ago in This Newsletter . . .

In the Fall 1989, we announced a new MS-DOS version of our Temperature Plotter and Voltage Plotter game-port interfacing programs. We also announced our e-mail address for the first time.

15 Years Ago in This Newsletter . . .

We announced our Apple® II Temperature program. We also included an article on compatibility with the new Apple IIc computer.

Shop at store.vernier.com

We have been taking orders by e-mail for years, but now we are pleased to announce that we offer complete online shopping, including a secure site, where you can use your credit card to place orders. Simply go to www.vernier.com and click on the Vernier Store link. Our complete catalog of products, with prices, is listed. You can place orders at any time, day or night.

You can also use the Vernier Store to calculate the cost of a potential order, and even print out an order list without actually placing an order. This is handy if you need to submit paperwork for approval at your school. We accept only Visa and MasterCard at the Vernier Store at this time, but we will be able to accept school purchase orders at the Vernier Store soon. If you wish to place an order with a school purchase order now, you may e-mail the order to orders@vernier.com, fax, call, or write us.

LabVIEW

This summer we developed some free tools to make it easier for you to use the National Instruments' LabVIEW program with the ULI and the Serial Box Interface. The Vernier LabVIEW package includes a set of drivers, virtual instruments, and samples to help you create your own Virtual Instruments (VIs). All of the included VIs are completely cross-platform compatible (Windows and Macintosh). These VIs were created in LabVIEW 5.0 Student Edition. You are welcome to download the Vernier LabVIEW package from the "Free Stuff" section of our web site.

Another happy Vernier customer!

Robby Antinone Russel might not be ready to take data just yet, but his parents, Linda Antinone and Mike Russel, wanted us to see how much he likes our stuff anyway.

Workshops

2-Year College Workshops for the 21st Century

Here are two workshops for two-year college physics teachers.

Activity-Based Physics & Digital Video Analysis, Nov. 11-13, 1999 at Lee College, Baytown, TX

Introductory College Physics in the 21st Century, Feb. 17-19, Seminole Community College, Sanford, FL

Additional workshops will be held during the next two years. For information, check http://tycphysics.org

Activity Based Physics

These institutes are for high school teachers of physics and/or physical science, and school administrators.

Session I (Starter): June 18-30, 2000
Session II (Follow-up): June 17-29, 2001

The eastern site is Dickinson College in Carlisle, PA, and the western site is University of Oregon in Eugene, OR. For more information, see http://physics.dickinson.edu/ABPInstitutes

Chautauqua Short Courses: Promoting Active Learning in Introductory Physics Courses

Instructors: Priscilla Laws, David Sokoloff, and Ronald Thornton

Course I: March 16-18, 2000, University of Puerto Rico, Mayaguez, Puerto Rico

Course II: June 5-7, 2000, Dickinson College, Carlisle, PA

These NSF-sponsored courses are open to college teachers. High school teachers are also admitted if space is available. There is a small application fee, but no tuition. For more information, contact David Sokoloff at sokoloff@oregon.uoregon.edu.

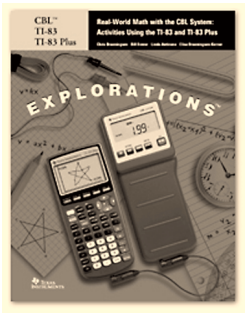
T³™ Affiliate Workshops

Next summer, Vernier–T³ affiliate workshops will be available for the first time. These workshops provide participants an opportunity to learn to collect data using TI Graphing Calculators *and* Windows or Macintosh computers. Be sure to look for more information on the T³ web site (www.t3ww.org/t3), in our 2000 Catalog, or on our web site.

Project PHYSLab 2000

Project PHYSLab is a very popular 3-week workshop that includes computer interfacing, spreadsheets, physics software, internet instruction, and low-cost physics equipment. It will be held July 3–July 21 in Portland, OR. Lodging, food, travel allowance, and a stipend are provided. The application deadline is February 28, 2000. Contact Lowell G. Herr at lherr@physlab.catlin.edu, or check http://physlab.catlin.edu.

Bits & Bytes



Real-World Math with the CBL (Revised)

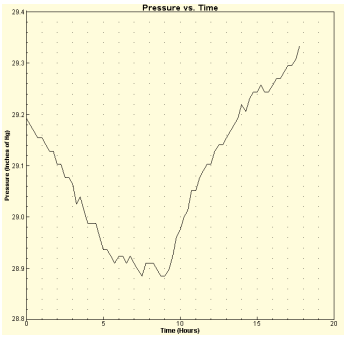
This popular book, which was written for the TI-82, has been revised to support the TI-83 and TI-83 Plus. Each activity contains keystrokes for these calculators. The disks in the back of the book contain calculator programs for all the TI graphing calculators except the TI-85. (Order Code TI-RWM, $20)

Logger *Pro* for New Apple Computers

Apple has produced several new computers (iMac, iBook, G3, and G4) that do not have serial ports. We now have two ways of using them with our sensors. If you get new LabPro interfaces next year, you can connect directly to the USB port. If you already have ULIs or Serial Box Interfaces, you can use a USB-to-serial adapter. We have done most of our testing using the Keyspan adapters and they work well. For updated information on USB-to-serial adapters, check our web site.

Hurricane Floyd

Judy B. Powell (North Carolina State University) sent us this graph, made in Raleigh, NC, during Hurricane Floyd. She used a calculator, CBL, and a Vernier Barometer.

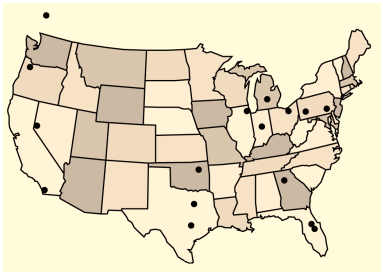


New Version of Logger *Pro*

Logger *Pro* version 1.2 for Macintosh and Windows was recently released. If you have already purchased Logger *Pro* and want to get a free upgrade, check the "Free Stuff" (Logger *Pro* upgrades) section of our web site.

Palm Computer Data Collection

ImagiWorks™, Inc. has developed a system called ImagiProbe™ that allows you to collect data with a Palm computer. This system consists of an interface for two analog sensors that can be used simultaneously. The ImagiProbe system ships with our Direct-Connect Temperature Probe, Light Sensor, and Voltage Probe. All of our other analog sensors can be used with ImagiProbe. (It does not support motion detectors, photogates, or radiation monitors.) ImagiWorks has also developed lab manuals for general science and water quality. Visit their web site at www.imagiworks.com for more information.



UPCOMING EVENTS

We will be exhibiting at all of the following conferences. For an updated list, visit the "Workshops" section of our web site.

Technology & Learning Conference (NSBA)	Dallas, TX	November 10-13
Supercomputing Conference	Portland, OR	November 15
American Mathematical Association of Two-Year Colleges (AMATYC)	Pittsburgh, PA	November 18-20
NSTA Southern Area Convention	Tulsa, OK	November 18-20
Pennsylvania Science Teachers Association (PSTA)	Hershey, PA	December 2-3
NSTA Western Area Convention	Reno, NV	December 2-4
AAPT National Convention	Kissimmee, FL	January 16-19
Texas Computer Education Association (TCEA)	Austin, TX	February 8-11
Indiana Science Teachers Meeting (HASTI)	Indianapolis, IN	February 9-11
Science Education Council of Ohio (SECO)	Cleveland, OH	February 17-19
Michigan Science Teachers Association (MSTA)	Lansing, MI	March 3-4
San Diego Science Educators (SDSEA)	San Diego, CA	March 10-11
T^3 (Teachers Teaching with Technology)	Dallas, TX	March 17-19
NSTA National Convention	Orlando, FL	April 6-9
National Council of Teachers of Mathematics Annual Meeting (NCTM)	Chicago, IL	April 13-15
British Columbia Science Teachers (CATALYST 2000)	Whistler, BC, Canada	April 14-15
Northwest Conference for Computer Education (NCCE 2000)	Portland, OR	April 19-21
National Education Computing Conference (NECC)	Atlanta, GA	June 26-28

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